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Mini-Mental State Examination Score in Elderly Albanian Population

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Abstract

Background: The Mini-Mental State Examination is a simple, informative and validated screening test of cognitive functions. Limited data of Mini-Mental State Examination scores has been published about elderly Albanian population.

Aims: The aim of this study is to evaluate the Mini-Mental State Examination scores in the elderly Albanian population (defined as age of 65 years or more).

Study design: Observational study.

Methods: 127 healthy elderly Albanians were interviewed and tested for their Mini-Mental State Examination score. Their scores were analyzed. Also was studied the effect of age, gender, education, family status, diabetes mellitus, hypertension, smoking, dyslipidemia and family history of dementia, on the scale score.

Results: Mini-Mental State Examination scores of 127 elderly subjects, aged 74,6 ± 6,9 years (range 65–95 years) were analyzed. There were 50 (39,4%) males and 77 (60,6%) females. In total 74 individuals (58,3%) resulted without cognitive impairment, 40 (31,5%) with mild cognitive impairment, 11 (8,7%) with moderate cognitive impairment and only 2 (1,57%) with severe cognitive impairment. There was a correlation between Mini-Mental State Examination score and education level. Other studied variables did not correlate with score. Concerning the different category of Mini-

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Mental State Examination score, Orientation is significantly related to gender, hypertension and family status. Registration is significantly associated with dyslipidemia. Attention and memory have a significant relation with age.

Conclusion: In our study, among 65 years old individuals with no previous brain disease, 58,3% resulted without cognitive impairment and 41,7% with cognitive impairment. Education was the most important determining factor of this score.

Keywords: Cognitive, dementia, risk factors, mini mental state examination.

INTRODUCTION

As life expectancy is growing worldwide, the aging of societies is a global phenomenon. In this context, health services are facing increasing pressure to care for older adults. Age is the most important risk factor for dementia and projections estimate there will be 135 million people with the disease in 2050, 71% of whom will live in low or middle-income countries (1).

Misdiagnosis rates for dementia are high, even in high-income countries and early detection of cognitive impairment can improve treatment and reduce costs (2).

The Mini-Mental State Examination (MMSE) is the most widely known brief cognitive test for the screening and detection of dementia (3). It is a brief, standardized method to grade patient's cognitive mental status. It assesses orientation, attention, immediate and short-term recall, language, and the ability to follow simple verbal and written commands. It provides a total score that places the individual on a scale of cognitive function (4). It is also a common measure of grading cognitive impairment, monitoring its evolution over time and estimating the treatment effects on cognitive function (5). Since its development, there has been a wealth of literature published on the MMSE, demonstrating it to be a relatively sensitive marker over dementia (6,7,8). This article addresses the use of the Mini-Mental State Examination (MMSE) for evaluation of the cognitive function in the community and primary care, in previously unevaluated people.

MATERIAL AND METHODS

This was an observational study that analyzed data from a population at a single point in time, elderly adults, defined according to National Institute of Health, as those who are 65 years of age or older. Volunteers were recruited from two community centers (Multidisciplinary Community Center, Municipality of Tirana; Care Center for the Elderly "At Moza"), and from two primary care health service, one from a rural area (Primary Care Center, Bradashesh, Elbasan) and one from an urban area (Primary Care Center Nr.9, Tirana). A team of 3 investigators trained the healthcare workers in these centers, leaving also printed instructions for the use of the MMSE scale.

After obtaining volunteers' written consent, the test was presented by healthcare workers in Albanian version, printed and prepared by the team of the same 3 investigators. The test generally took between 10 and 20 min. The participants' demographic data including age, gender, level of education, and marital status, as well as history of heart diseases and family history of dementia were recorded. Atherosclerosis risk factors were also studied (diabetes mellitus (DM), hypertension (HTN), smoking, dyslipidemia). A volunteer was considered to have hypertension, diabetes mellitus or dyslipidemia based on a definite previous diagnosis of any of these by their primary healthcare provider and/or current use of antihypertensive, anti-diabetic or anti-lipid medications. Exclusion criteria included having a

neurological medical illness, history of any brain disease that has left any deficit, and taking any central nervous system acting agents. Absence of these criteria was used to define healthy people.

The score procedure was done in the field; which included patients' waiting areas in outpatient clinics, or living areas of volunteers.

Statistical analysis

Data was collected on a separate sheet for each volunteer and then analyzed using the SPSS (Statistical Package for Social Sciences) 26.0, program in which all statistical analysis was performed. For all categorical variables (nominal including scale binary/dichotomous, and/or ordinal), frequencies (absolute numbers) and the respective percentages were calculated. For all numerical variables for data subject to normal distribution, were calculated arithmetic means ± corresponding standard deviations.

Random connections between variables were analyzed through their correlation coefficient Kendal's tau-b.

The differences between the groups for continuous quantitative variables, between the two groups, were performed through the student's test.

Differences between groups for qualitative variables were realized through the Chi-square test. Values of $p \leq 0.05$ were considered significant.

RESULTS

Out of 138 interviewed volunteers, 11 were excluded due to verified history of previous brain disease and 127 fulfilled the inclusion criteria and their scores were analyzed. The mean age was 74,6 ± 6,9 years (range 65-95 years). The median age was 73 years old. In total 74 individuals (58,3%) resulted without cognitive impairment, 40 individuals (31,5%) resulted with mild cognitive impairment, 11 individuals (8,7%) resulted with moderate cognitive impairment and only 2 individuals (1,57%) resulted with severe cognitive impairment.

Table 1 summarizes the general features and findings in the population. There were 50 (39,4%) males and 77 (60,6%) females without a significant difference between gender and MMSE score (P = 0,292). The majority 91 (71,7%) lived in a family, while 36 subjects lived alone (28,3%), with a significant difference in MMSE Score (p =0,024). The individuals that lived alone resulted with lower scale points. There was not any correlation between MMSE score and family income or employment.

Table 1. Demographic characteristics

Variable		Cognitive impairment				Total n=127	P value
		Severe (0-9 point) n=2	Moderate (10-19 point) n=11	Mild (20-25 point) n=40	Without impairment (26-30 point) n=74		
Gender	Male	0	2	17	31	50	0.292
		0.0%	18.2%	42.5%	41.9%	39.4%	
	Female	2	9	23	43	77	
		100.0%	81.8%	57.5%	58.1%	60.6%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	
Education	8-years (Low education)	0	10	16	25	51	0.018
		0.0%	90.9%	40.0%	33.8%	40.2%	
	Medium education	1	1	17	31	50	
		50.0%	9.1%	42.5%	41.9%	39.4%	
	High education	1	0	7	18	26	
		50.0%	0.0%	17.5%	24.3%	20.5%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	
Employment in the past	Physical work	1	9	24	38	72	0.272
		50.0%	81.8%	60.0%	51.4%	56.7%	
	Mental work	1	2	16	36	55	
		50.0%	18.2%	40.0%	48.6%	43.3%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	
Current employment	Physical work	0	0	0	3	3	0.196
		0.0%	0.0%	0.0%	4.1%	2.4%	
	Mental work	0	0	0	8	8	
		0.0%	0.0%	0.0%	10.8%	6.3%	
	Retired	2	11	40	63	116	
		100.0%	100.0%	100.0%	85.1%	91.3%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	
Family status	Lives alone	2	4	15	15	36	0.024
		100.0%	36.4%	37.5%	20.3%	28.3%	
	Lives in family	0	7	25	59	91	
		0.0%	63.6%	62.5%	79.7%	71.7%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	

Family income	Low	1	10	28	53	92	0.672
	(5000-30000 ALL)	50.0%	90.9%	70.0%	71.6%	72.4%	
	Medium (45000-138000 ALL)	1	1	12	19	33	
		50.0%	9.1%	30.0%	25.7%	26.0%	
	High (>138000 ALL)	0	0	0	2	2	
		0.0%	0.0%	0.0%	2.7%	1.6%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	

Other factors that were studied included correlation between probably risk factors like Body mass index (BMI), Diabetes mellitus (DM), Arterial hypertension (HTA), smoking, dyslipidemia, heart disease, family history of dementia, smoking, drinking alcohol and MMSE score (Table 2.) None of these factors correlated with MMSE score in our study.

Table 2. Correlation between different risk factors and MMSE score

Risk factors		Cognitive impairment				Total n=127	P value
		Severe (0-9 point) n=2	Moderate (10-19 point) n=11	Mild (20-25 point) n=40	Without impairment (26-30 point) n=74		
Body Mass Index	18-25	2	4	13	27	46	0.665
		100.0%	36.4%	32.5%	36.5%	36.2%	
	25-30	0	5	20	37	62	
		0.0%	45.5%	50.0%	50.0%	48.8%	
	>30	0	2	7	10	19	
		0.0%	18.2%	17.5%	13.5%	15.0%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	
Smoking	Yes	0	2	14	24	40	0.556
		0.0%	18.2%	35.0%	32.4%	31.5%	
	No	2	9	26	50	87	
		100.0%	81.8%	65.0%	67.6%	68.5%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	
Alcohol	Yes	0	1	7	13	21	0.82
		0.0%	9.1%	17.5%	17.6%	16.5%	
	No	2	10	33	61	106	
		100.0%	90.9%	82.5%	82.4%	83.5%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	

Dementia history	Yes	0	0	4	8	12	0.675
		0.0%	0.0%	10.0%	10.8%	9.4%	
	No	2	11	36	66	115	
		100.0%	100.0%	90.0%	89.2%	90.6%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	
Diabetes mellites	Yes	0	4	14	25	43	0.782
		0.0%	36.4%	35.0%	33.8%	33.9%	
	No	2	7	26	49	84	
		100.0%	63.6%	65.0%	66.2%	66.1%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	
Arterial hypertension	Yes	1	10	30	51	92	0.396
		50.0%	90.9%	75.0%	68.9%	72.40%	
	No	1	1	10	23	35	
		50.0%	9.1%	25.0%	31.1%	27.6%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	
Dyslipidemia	Yes	0	3	16	35	54	0.345
		0.0%	27.3%	40.0%	47.3%	42.5%	
	No	2	8	24	39	73	
		100.0%	72.7%	60.0%	52.7%	57.5%	
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	

Table 3 shows the relationship between demographic characteristics and MMSE category scores such as orientation and registration.

Orientation is significantly related to gender, HTA and family status. Specifically, the highest average scores of orientations are found in men (p=0.032). People with hypertension have lower scores than those without hypertension (p=0.027). People living with other family members have higher mean scores than those who live alone (p=0.001).

Registration is significantly associated with dyslipidemia. People with high body fat had higher mean registration points than those without high body fat (p=0.001).

Table 4 shows the relationship between demographic characteristics and MMSE category scores such as attention, memory and speaking/language points.

Attention has a significant relationship with age, educational level and family status. Here is an opposite relationship between age and attention, with increasing age, attention decreases (p=0.037). A direct relationship is between educational level and attention where people with low educational level have lower scores than educated ones (p=0.003). Also, people who live with other family members have higher average scores than those who live alone (p=0.014).

Memory has a significant opposite relationship between age and memory, as age increases, memory decreases (p=0.002).

No significant association was found regarding the speaking and language.

Table 3. The relationship between demographic characteristics and MMSE category scores such as orientation and registration

Orientation	**Points**			**Registration**	**Points**	
Variables	**Correlation coefficient**	**P value**		**Variables**	**Correlation coefficient**	**P value**
Gender		0.032		Gender	-0.050	0.561
Age	-0.115	0.102		Age	-0.030	0.679
Education level	0.119	0.136		Education level	-0.018	0.827
Smoking	-0.019	0.825		Smoking	-0.049	0.569
Alcohol	-0.013	0.879		Alcohol	-0.142	0.100
Dementia history	-0.062	0.465		Dementia history	-0.125	0.146
DM	-0.012	0.884		DM	-0.130	0.132
HTA	.186*	0.027		HTA	-0.089	0.301
Dyslipidemia	0.009	0.914		Dyslipidemia	-.289**	0.001
Living form	.278**	0.001		Living form	-0.013	0.876
Family income	0.126	0.133		Family income	-0.079	0.356

Table 4. The relationship between demographic characteristics and MMSE category scores such as attention, speaking and memory

Attention Points				Memory Points				Speaking, Language Points		
Variables	Correlation coefficient	P value		Variables	Correlation coefficient	P value		Variables	Correlation Coefficient	P value
Gender	-0.001	0.992		Gender	-0.057	0.497		Gender	-0.045	0.589
Age	-.139*	0.037		Age	-.212**	0.002		Age	-.267**	0.000
Education level	.223**	0.003		Education level	0.085	0.282		Education level	0.089	0.260
Smoking	0.009	0.906		Smoking	-0.024	0.776		Smoking	0.014	0.865
Alcohol	0.009	0.911		Alcohol	0.069	0.410		Alcohol	-0.034	0.680
Dementia history	0.008	0.925		Dementia history	-0.029	0.733		Dementia history	-.198*	0.017
DM	0.100	0.213		DM	-0.022	0.791		DM	0.039	0.637
HTA	0.122	0.126		HTA	0.042	0.616		HTA	0.084	0.309
Dyslipidemia	-0.031	0.697		Dyslipidemia	-0.112	0.182		Dyslipidemia	-.195*	0.019
Living form	.197*	0.014		Living form	0.156	0.061		Living form	.202*	0.015
Family income	0.135	0.089		Family income	0.008	0.926		Family income	0.051	0.540

DISCUSSION

Currently, there is no national estimate of the prevalence of dementia in Albania. As the world's population ages, the decline of cognitive function among older adults is becoming common and poses significant threats to their mental and physical wellbeing; moreover, its burden extends to family caregivers (9). In the present study 31,5% of the participants were affected by mild cognitive impairment, 8,7% of the participants were affected by moderate cognitive impairment and only 1,57% of the participants were affected by severe cognitive impairment. Mild cognitive impairment is a transitional stage before dementia, and the annual conversion rate to dementia reaches up to 20.0% (10,11). Early detection of cognitive impairment can slow progression of the disease and offers medical, emotional, and financial benefits to affected individuals and their families (12,9). Our study revealed a significant association between impaired cognitive function and education. This finding is consistent with previous studies in which low educational level is associated with cognitive performance, but differed concerning the female gender, and low income, that, in these studies were also associated with poor cognitive performance (13,14,15).

However, our findings are consistent from those of the Chinese survey, which did not reveal gender differences in cognitive function across two age cohorts (15). Family status (living alone) in our study was associated with reduced cognitive function. This finding is similar to another study, which reported that who lives in family may serve as a buffer against the negative cognitive impacts of aging (16). Another study confirmed that those who lived alone reported greater feelings of emotional loneliness than those living with others (17). Interestingly, the literature supports the finding that working is protective. This finding is consistent with that of a study carried out by Xue et al. They found the cognitive function of individuals who were not currently working to be inferior to that of their counterparts. They suggest the cognitively stimulating activities associated with employment may benefit the memory of older adults (18). In our study we do not have this result. Approximately 48,8% of the participants were overweight, and 15% were obese according to the WHO classification. The investigators found that a lower BMI was associated with faster rates of cognitive decline, specifically, semantic and episodic memory (19). We didn't find a significant association between nutritional status and cognitive function maybe related to the fact that in our study we did not have individuals with malnutrition. There is a study, which shows that malnutrition increases the risk for cognitive impairment (20).

Study limitations:

First, the number of volunteers was not large enough to make solid conclusions. Second, the population studied does not necessarily represent the whole population of Albania. However, we believe that the results of this study help

researchers and clinicians who study or take care of Albanian patients with suspected dementia.

CONCLUSIONS

In our study, among 65 years old individuals with no previous brain disease, 58,3% resulted without cognitive impairment and 41,7% with cognitive impairment. Education was the most important determining factor of this score.

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Conflict of Interest Statement: The author declares that have no conflict of interest.

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